

# Claims

- [c1] 1. A semiconductor device comprising
- a test circuit containing at least one transistor as a device under test(DUT)having a drain, a source, a gate and a channel region under the gate between the drain and the source in a well with a short channel length,
  - a reference circuit providing a fixed reference voltage value,
  - a bias circuit applying a bias voltage to the gate of the device under test (DUT),
  - a current circuit providing a fixed current to the drain of the device under test (DUT),
  - a comparator circuit comparing the voltage at the drain of the test circuit with the output of the reference circuit and providing a comparison result.
- [c2] 2. The semiconductor device according to claim 1,wherein the bias voltage applied to the gate of the DUT is of a value close to the threshold voltage value of the DUT.
- [c3] 3. The semiconductor device according to claim 1, wherein the bias circuit comprises a bandgap reference circuit.

- [c4] 4. The semiconductor device according to claim 1,  
wherein  
the current circuit comprises a current source and a current mirror circuit connected between said current source and the drain contact of the DUT.
- [c5] 5. The semiconductor device according to claim 1,  
wherein a well potential generator for generating a well potential is provided, said well potential generator being coupled to the output of the comparator circuit receiving the comparison result as an input and to a well contact of the DUT for applying the well potential as an output.
- [c6] 6. The semiconductor device according to claim 5,  
wherein  
the well potential generator applies the well potential to the well contact of the DUT when the received comparison result indicates that the output voltage of the test circuit is smaller than the output voltage of the reference circuit.
- [c7] 7. The semiconductor device according to claim 6,  
wherein the well potential generator provides a well potential up to the point in which the received comparison result indicates that the output voltage of the test circuit is equal to the output voltage of the reference circuit.

- [c8] 8. The semiconductor device according to claim 5, wherein said well potential generator comprises a voltage source for providing a fixed potential to the well of the DUT and the well of further devices of a digital circuit wherein said digital circuit is integrated in the semiconductor device.
- [c9] 9. The semiconductor device according to claim 5, wherein said well potential generator comprises a charge pump as a voltage source.
- [c10] 10. A Method for detecting variations of the threshold voltage  $V_t$  in a semiconductor device in sub-micron technology comprising a test circuit containing at least one transistor as a device under test (DUT) having a drain, a source, a gate and a channel region under the gate between the drain and the source in a well with a short channel length, said method comprising:
- providing a fixed reference voltage value by a reference circuit,
  - applying a bias voltage to the gate (3) of the device under test (DUT) by a bias circuit,
  - providing a fixed current to the drain (2) of the device under test (DUT) by a current circuit,
  - comparing the voltage at the drain (2) of the test cir-

cuit with the output of the reference circuit and providing a comparison result by a comparator circuit.

- [c11] 11. The method according to claim 10, wherein the method further comprises providing a well potential to the well of the test circuit when the output voltage of the test circuit is smaller than the output voltage of the reference circuit until the output voltage of the test circuit is equal to the output voltage of the reference circuit.